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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/060,247	02/01/2002	Hiromi Yuasa	219138US2SRD	8893

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EXAMINER

BERNATZ, KEVIN M

ART UNIT

PAPER NUMBER

1773

DATE MAILED: 06/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/060,247

Applicant(s)

YUASA ET AL.

Examiner

Kevin M Bernatz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 1-17 and 19-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 18 and 23-27 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7. 6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. Amendments to claims 25 - 27, filed on March 30, 2003, have been entered in the above-identified application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Election/Restrictions

3. Applicant's election with traverse of species 3-A (a MR device wherein both of the pinned and free layers are laminate structures; where at least one of the free layer or the pinned layer comprise a Fe-rich alloy (i.e. the amount of Co and/or Ni in the claimed alloy is ≤ 50 at%) in Paper No. 6 is acknowledged. The traversal is on the ground(s) that it would not be a serious burden to the Examiner to search all the present claims. This is not found persuasive since, while the search may be overlapping, there is no reason to believe the search would be coextensive. The requirement is still deemed proper and is therefore made FINAL.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed (the generic term "Magnetoresistive device" is not considered descriptive of the proposed improvement over the prior art).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 18 and 23 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (U.S. Patent App. No. 2001/0040781 A1) in view of Yoshikawa et al. (JP 11-154609 A) and Meguro et al. (IEEE Trans. Mag., 35(5), 1999, 2925 – 2927). The above rejection will refer to Yoshikawa et al. (U.S. Patent No. 6,132,892), which is the English-language equivalent of JP '609 A.

Regarding claims 18 and 25, Tanaka et al. disclose a magnetoresistive device (*Paragraphs 2 and 4*), comprising: a magnetization pinned layer (*Figure 1, element 25 and Paragraph 0105*) of which magnetization direction is substantially pinned to one direction (*Paragraph 0013*); a magnetization free layer (*Figure 1, element 20 and Paragraph 0105*) of which magnetization direction is changed in accordance with an external magnetic field (*Paragraph 0027*); a nonmagnetic intermediate layer formed

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between the magnetization pinned layer and the magnetization free layer (*Figure 1, element 29 and Paragraph 0105*); and electrodes allowing a sense current to flow in a direction substantially perpendicular to the plane of the stack including the magnetization pinned layer, the nonmagnetic intermediate layer and the magnetization free layer (*Figure 1, elements 32 – 34 and Paragraphs 0117 – 0121*), wherein both of the magnetization pinned layer and the magnetization free layer has a laminate structure (*Figure 1, elements 21 – 23 and 26 – 28 and Paragraphs 0108 and 0109*) comprising alternately laminated layers of: (i) FeCoNi alloy (*Paragraphs 0136, 0140 and 0143*); and (ii) at least one layer formed of at least one element selected from the group consisting of Cr, V, Ta, Nb, Sc, Ti, Mn, Cu, Zn, Ga, Ge, Zr, Hf, Y, Tc, Re, Ru, Rh, Ir, Pd, Pt, Ag, Au, B, Al, In, C, Si, Sn, Ca, Sr, Ba, O, N and F (*Paragraphs 0137 and 0141*).

Tanaka et al. fail to disclose using a FeCoNi Fe-rich alloy meeting applicants' claimed composition limitations.

However, Yoshikawa et al. teach that Fe-rich soft-magnetic alloys possessing a composition meeting applicants' claimed composition limitations (*col. 5, lines 59 – 65; col. 6, lines 20 – 30; and Table 6 – Fe₆₀Co₁₅Ni₂₅*) for use in thin-film magnetic heads (*col. 1, lines 8 – 45*) wherein the use of a Fe-rich composition is desired because "the first phase A can be constituted of a Fe-Co alloy of body-centered cubic structure in which large saturation magnetic flux density can be obtained" (*col. 6, lines 26 – 30*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Tanaka et al. to use an Fe-rich FeCoNi alloy meeting applicants' claimed composition limitations as taught by

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Yoshikawa et al. in order to produce a Fe-Co alloy of body-centered cubic structure in which large saturation magnetic flux density can be obtained.

Neither Tanaka et al., nor Yoshikawa et al. teach a non-magnetic layer (ii) in the laminate meeting applicants' claimed 0.3 – 1 nm thickness limitation.

However, Meguro et al. teach that in synthetic laminated magnetic structure (i.e. magnetic/non-magnetic/magnetic), the Ru layer thickness can be

However, Meguro et al. teach that in synthetic laminated magnetic structures (i.e. magnetic/non-magnetic/magnetic) the Ru layer thickness is a results effective variable that can be optimized to effect the antiferromagnetic RKKY-like interlayer exchange coupling (*Introduction section*). Furthermore, Meguro et al. teach that an appropriate value of the thickness would be 0.8 nm (*Experimental section*). Therefore, the Examiner deems that it would have been obvious to one having ordinary skill in the art to use a non-magnetic layer (ii) thickness meeting applicants' claimed thickness limitation by optimizing the results effective variable through routine experimentation. *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Regarding claims 23, 24, 26 and 27, Tanaka et al. disclose nominal apparatus elements meeting applicants' claimed "a magnetic head" and "a magnetic recording-reproducing apparatus, comprising a magnetic recording medium" limitations (*Paragraphs 0008 and 0031*).

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Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Araki et al. (U.S. Patent No. 6,074,743) teach using Ni-rich and Co-rich alloys in MR elements (*col. 8, lines 47 – 55 and col. 10, line 55 bridging col. 11, line 11*). Prakash et al. (U.S. Patent App. No. 2002/0073785 A1) teach a MR element possessing a synthetic pinned layer (*Figure 4, element 440*) and a synthetic free layer (*Figure 4, element 420*), wherein both can comprise NiFeCo separated by Ru layers (*Paragraphs 0045 - 0046*).


8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.



KMB
June 14, 2003



Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700